Mathematics F.M. - 15

Internal exam Sem - III (~~21~~-23) Time - $1\frac{1}{2}$ h

Paper - V Theory of Real function

Answer any three ques but Q.N.01 is compulsory.

Q.1 (a) Define ϵ-δ defination of limit.

(b) Define continous functions.

(c) Define uniform continity.

(d) Define Bounded function.

(e) State ~~Lange~~ Lagrange's Mean value Theorem.

(2) State & proof Rolle's theorem.

(3) prove that the function

$$f(x) = \begin{cases} x\sin\frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

is continuous for every real x.

(4) Show that the function

$$f(x) = x\sin\frac{1}{x}; \quad x \neq 0$$

and $f(x) = 0, \; x = 0$

is continuous at $x=0$ but not derivable

(5) State & prove Darboux's theorem.

Mathematics, F.M.-15
Time $1\frac{1}{2}$ h

Internal Exam sem - III (20-23)
Paper 6 Group theory.

Answer any three Ques but Q.N.01 is compulsory.

1. (a) Define abelian group with example.
(b) Define internal direct product of a group G.
(c) Define cyclic group.
(d) Define homomorphism.
(e) Define automorphism.

2. If G be a group, then prove that
$(ab)^{-1} = b^{-1}a^{-1}$, $\forall\, a, b \in G$.

3. If H_1 and H_2 are two subgroups of a group G, then H_1 and H_2 is also a subgroup of G.

4. State & prove Lagrange's theorem.

5. State & prove Cayley's theorem.

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Internal Exam for Sem-III (20-23) Time - $1\frac{1}{2}$ h

Paper - 7 PDE system of ODE

Answer any three ques but Q.N.01 is compulsory.

Q.1 (a) Define a partial differential equation.

(b) Define quasi-linear equation.

(c) Write the Charpit's auxiliary equation.

(d) Write Laplace equation in three variables.

(e) Solve $px + qy = z$.

(2) Solve $z(xp - yq) = y^2 - x^2$

(3) Solve the quasi-linear PDE.

$3p + 2q = 4$

(4) Solve $3p + q = z + \tan(x - 3y)$

(5) Find the complete integral of

$x^2p^2 + y^2q^2 = z^2$

Mathematics

F.M.-15
Time $1\frac{1}{2}$ h

Internal Exam for Sem III (20-23)

Paper- GE Real Analysis

Answer any three ques but Q.N.-1 is compulsory.

(1) (a) Define bounded set.

(b) Define Bounded sequence.

(c) Define Bounded above set.

(d) Define Supreme and infima

(e) Define infinite series

(2) Prove that every convergent sequence is bounded.

(3) Prove that the sequence
$\sqrt{2}, \sqrt{(2\sqrt{2})}, \sqrt{2\sqrt{2\sqrt{2}}}), \ldots$ converges to 2.

(4) State & Prove Leibnitz test

or

State & Prove Root test

(5) Test for convergence the series whose general term is $\frac{1}{n^{1+\frac{1}{n}}}$